

RAILWAY ENGINEERING

AND MAINTENANCE OF WAY

VOL. III.

CHICAGO

AUGUST, 1907

NEW YORK No. 8



OUR TRACK DRILLS

will save
you money.
Send for
circulars.

FRANCIS REED CO.,
Worcester, Mass.

McInnes Tool Steel for Track Drills and Tools

High



Grade

McInnes Steel Co., Ltd., Corry, Pa.

RODGER BALLAST CAR CO. CONVERTIBLE CAR

--See Page 8

LOCOMOTIVES

COACHES

CARS

New Freight Cars

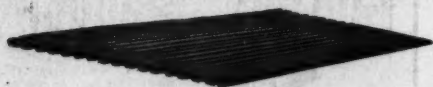
Built to any specification, in any quantity for PROMPT DELIVERY

HICKS LOCOMOTIVE AND CAR WORKS, Builders, CHICAGO

HICKS
LOCOMOTIVE
AND
CAR WORKS
CHICAGO

K. & M. 85 Per Cent. Magnesia Sectional Locomotive Lagging

ASBESTOS CORRUGATED ROOFING and SHEATHING



No Paint. No Rust. Fireproof. Waterproof. Everlasting

Asbestos "Century" Sheathing and Shingles

Franklin Mfg. Co.

C. J. S. MILLER, Pres.

Franklin, Pa.

Turnbuckles Forgings



Cleveland City Forge
and Iron Co.

CLEVELAND, OHIO

Sharpens Small Tools

at the work.

It has been found
to be of great
value. Can be
carried anywhere.
It is right at the
work and that
means economy.
It will pay you to
investigate.
Prices and circu-
lars on request.



ROYAL MFG. CO.
290 E. Walnut St. Lancaster, Pa.

THE HANNA MFG. CO.

High-Grade
Engineering
Instruments

360 River St., Troy, N.Y.
Illustrated Catalogue on application.

SPENCER OTIS CO.

Tie Plates
Nut Locks
Rail Benders

CHICAGO

OMAHA

CARBURET BLACK...

FOR SATISFACTORY SERVICE
Steel Cars, Bridges, and All Ex-
posed Railway Work.

WADSWORTH-HOWLAND CO., Chicago

SMOKE JACKS PAUL DICKINSON

1403 SECURITY BLDG
CHICAGO

SIGNAL LAMPS

With Balanced Top
Draught Ventilation

Made of No. 18 Gauge Steel, all parts riveted

Long Time Burners

OF LATEST DESIGN

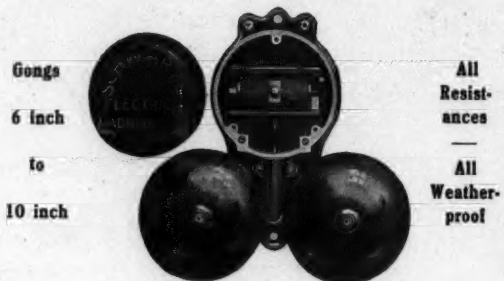
Engine Marker Lamps
Caboose and Train Lamps
Locomotive Headlights

Manufactured by
The Dressel Railway Lamp Works

Adreon & Company
ST. LOUIS

MAGNETO LOUD RINGING

Extension Telephone Bells



Efficiency, Durability and Price
will interest you

SCHWARZE ELECTRIC CO.

Main Office and Factory :: ADRIAN, MICH.

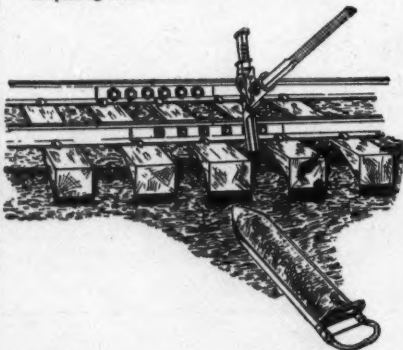
Branches: {
Chicago, 324 Dearborn St.
St. Louis, Mo., 708 Victoria Bldg.
Pittsburg, Renshaw Bldg.
San Francisco, 903 Atlas Bldg.

WALTERS' BALLAST PLACING DEVICE

Patented March 21, 1905

Has been placed in service on eleven trunk lines
and eight smaller railroads since April 1st.

FIG. 1—Showing ballast removed from end of ties to be raised,
track jacked up and device in position to receive ballast
for placing under tie.



We will guarantee that every particle of ballast will remain under tie and that machine will work in any kind of ballast.

Order Samples

Satisfaction guaranteed or money refunded.

Reference:
Any Bank
in the
City.

FIG. 2—Showing pan removed, ballast under tie, and cleaner ready to be withdrawn.



WALTERS & OKELL
Ft. Madison, Iowa

Gibraltar Bumping Post

STRUCTURAL STEEL
INSTALLATION SIMPLE
MINIMUM COST OF MAINTENANCE



Built on Strictly Engineering Principles
and possesses strength, durability, and superiority of design
for resisting impact. Pleased to send new Catalog No. 8 on
request.

McCord & Company
CHICAGO NEW YORK



We are the Largest Producers
and Manufacturers in the World

OF Pure Asphalt

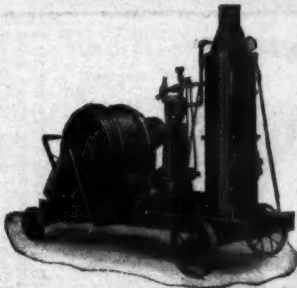
Mastics
Roofing Materials
Insulating Gums
Paint and Varnish
Gums

Pipe Dip and Coatings
Railroad Coatings
Waterproofing
Paving Asphalt and
Fillers
Mineral Rubber

Our product is *always uniform*, contains 100% Bitumen, and is ready for use when it leaves the factory. If *quality* and *price* is an object write us before making your contracts.

Standard Asphalt & Rubber Co.

GENERAL OFFICES: 944 First National Bank Bldg., CHICAGO, ILL., U. S. A.



Chicago Concrete Mixer

EFFICIENT - SIMPLE - DURABLE

WHY DUMP THE MIXED CONCRETE ON THE GROUND and then shovel into Wheelbarrows
WHEN YOU CAN DUMP DIRECT INTO THE BARROWS WITH THE CHICAGO MIXER?

It is the only Batch Mixer that can dump into wheelbarrows successfully, saving time and expense. Your wheelmen take their load themselves. It does not require an extra man to dump the Mixer. The material is thrown back and forth and rolled over and over 100 times per minute. The CHICAGO CONCRETE MIXER is lower on the charging side than other Mixers. It is also lighter. The Mixer does not have to be stopped for either loading or discharging. We equip our Mixers with Steam or Gasoline Engine and Motor Power—on Trucks or Skids. Send for catalogue which explains why it is the best all around Mixer on the market.

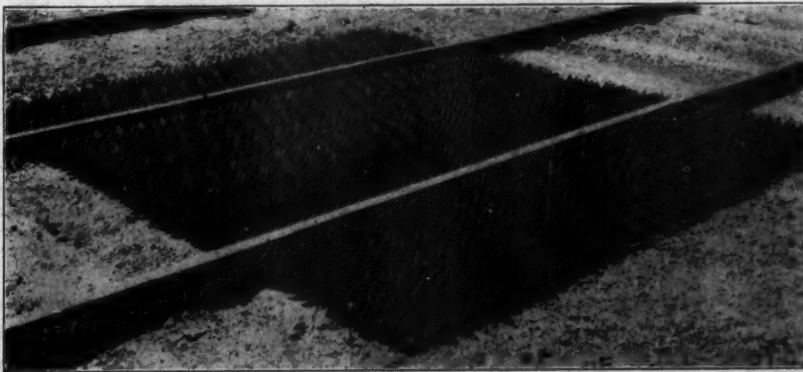
CHICAGO CONCRETE MACHINERY CO., 20 So. Canal Street, CHICAGO, ILL.

NEW YORK CONCRETE MACHINERY & SUPPLY CO., Eastern Agents,
78-80 Murray Street, NEW YORK, N. Y.

BEALL & CO., 321 Hawthorn Ave., Northwestern Agents,
PORTLAND, OREGON.

A. L. YOUNG MACHINERY CO., Western Agents, 19 Howard Street, SAN FRANCISCO, CAL.

The Abernathy Steel Surface Cattle Guard



Made in four sections.
Each section weighs 75
lbs. Interchangeable;
can be placed close
to rail—Track ties form
its only foundation.
No special instructions
necessary for placing.

Send for further particulars

STANDARD CATTLE GUARD CO., Birmingham, Ala.



"METAL STEEL" PAINT

ST. LOUIS SURFACER & PAINT CO., MAKERS.
ST. LOUIS

FOR
Structural Iron
Bridges,
Tanks, Etc.

CLASSIFIED INDEX OF ADVERTISERS

Anti Rall Creepers.
Adreon & Co., St. Louis.
Asbestos Products. All kinds.
Franklin Mfg. Co., Franklin, Pa.
Asbestos Roofing Slates.
Franklin Mfg. Co., Franklin, Pa.
Asbestos Sheathing.
Franklin Mfg. Co., Franklin, Pa.
Asphalt.
Standard Asphalt & Rubber Co., Chicago.
Asphalt Roofing.
Stowell Mfg. Co., Jersey City, N. J.
Asphalt Roofing Paints.
Carey Mfg. Co., The Philip, Cincinnati, O.
Ballast Cars.
Rodger Ballast Car Co., Chicago.
Ballast Finishing Devices.
Adreon & Co., St. Louis.
Rodger Ballast Car Co., Chicago.
Walters & Okell, Ft. Madison, Ia.
Ballast Unloaders.
Rodger Ballast Car Co., Chicago.
Battery Chutes.
Buda Foundry & Mfg. Co., Chicago.
Bells.
Schwarze Electric Co., Adria Mich. —
Bell Ringers.
Adreon & Co., St. Louis, Mo.
Blocks and Tackles.
Patterson Co., W. W., Pittsburg, Pa.
Blue Print Papers.
Kolesh & Co., New York.
Blue Printing Machines.
Kolesh & Co., New York.
Boarding Camps.
Railway Boarding Camp & Catering Co., Ill.
Bolts and Nuts.
Adreon & Co., St. Louis, Mo.
Railway Supply Co., St. Louis.
Books.
Andel & Co., Theo., New York.
Wiley, John & Sons, New York.
Bridge Paint.
Acme White Lead & Color Co., Detroit, Mich.
Carey Mfg. Co., The Philip, Cincinnati, O.
Detroit Graphite Mfg. Co., Detroit, Mich.
Dixon, Joseph, Crucible Co., Jersey City.
Sherwin-Williams Co., Cleveland, O.
Stowell Mfg. Co., Jersey City, N. J.
Suydam Co., M. B., Pittsburg, Pa.
Wadsworth Howland Co., Chicago.
Bumping Posts.
Mechanical Mfg. Co., Chicago.
McCord & Co., Chicago.
Building Felts and Papers.
Franklin Mfg. Co., Franklin, Pa.
Cars.
Torbert, A. C. & Co., Chicago.
Cars Ballast.
Rodgers Ballast Car Co., Chicago.
Cars Dump.
Rodgers Ballast Car Co., Chicago.
Cars Rebuilt.
Atlantic Equipment Co., New York.
Elks Car & Locomotive Works, Chicago.
Gas Replacers.
Buda Foundry & Mfg. Co., Chicago.
Cars, Second Hand.
Atlantic Equipment Co., New York.
Cast Iron Pipe.
Yale, Julian L. & Co., Chicago.
Cattleguards.
Adreon & Co., St. Louis, Mo.
Buda Foundry & Mfg. Co., Chicago.
Johnson, The W. P. Co., Chicago.
Standard Cattle Guard Co., Birmingham, Ala.
Chains.
Adreon & Co., St. Louis, Mo.
Patterson Co., W. W., Pittsburg, Pa.
Chimney Cast Iron.
Dickinson, Paul, Chicago.
Clay Pipe.
Evans & Howard Fire Brick Co., St. Louis, Mo.
Coal and Ore Handling Machinery.
Rodger Ballast Car Co., Chicago.
Cold Water Paints.
Carey Mfg. Co., The Philip, Cincinnati, O.
Computing Machines.
Kolesh & Co., New York.
Concrete Pipe, Reinforced.
Reinforced Concrete Pipe Co., Jackson, Mich.

Concrete Mixers.
Chicago Concrete Machinery Co., Chicago.
Conduits—Reinforced Concrete.
Reinforced Concrete Pipe Co., Jackson, Mich.
Contractors' Equipment and Supplies.
Adreon & Co., St. Louis.
Atlantic Equipment Co., New York.
Chicago Concrete Machinery Co., Chicago.
McKeown, H. J., Cincinnati, O.
Porter, H. K. Co., Pittsburgh.
Railway Boarding Camp & Catering Co., Moline, Ill.
Railway Supply Co., St. Louis.
Rodger Ballast Car Co., Chicago.
Contractors Light.
Wells Light Mfg. Co., New York.
Contractor's Locomotives.
Vulcan Iron Works, Wilkesbarre, Pa.
Coupler and Parts.
Adreon & Co., St. Louis, Mo.
Crabs.
McKeown, H. J., Cincinnati, O.
Crossing Bells.
Schwarze Electric Co., Adrian, Mich.

Crossing Gates.
Buda Foundry & Mfg. Co., Chicago.
Crossing Signals.
Adreon & Co., St. Louis.
Crossings (See Frogs and Crossings.)
McKeown, H. J., Cincinnati, O.
Culvert Pipe Clay.
Evans & Howard Fire Brick Co., St. Louis, Mo.
Culvert Pipe—Reinforced Concrete.
Reinforced Concrete Pipe Co., Jackson, Mich.
Ditching and Excavating Machinery.
Atlantic Equipment Co., New York.
Doors, Steel Rolling.
Adreon & Co., St. Louis, Mo.
Drain Pipe.
Evans & Howard Fire Brick Co., St. Louis, Mo.
Draughting Room Supplies.
Kolesh & Co., New York.
Dredges.
Atlantic Equipment Co., New York.

A. D. DOTY, C. E., Manager

THE

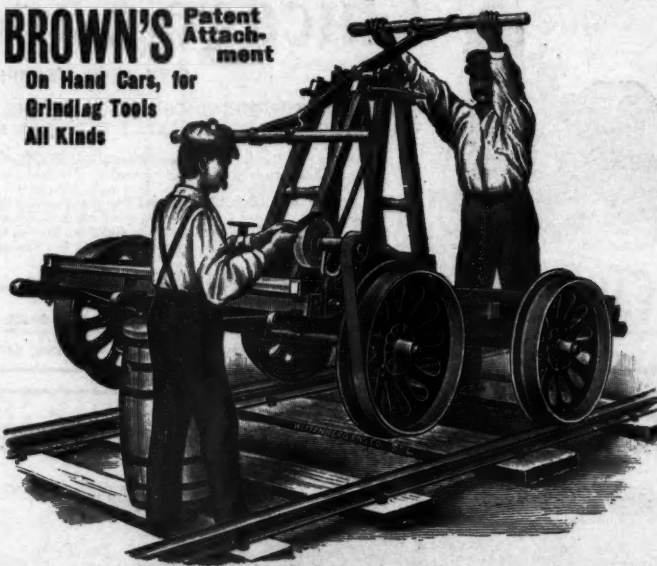
Established 1900

NEW YORK ENGINEERING AGENCY

35 WARREN STREET, NEW YORK CITY

High Grade Technical Men Furnished

BROWN'S

Patent
AttachmentOn Hand Cars, for
Grinding Tools
All Kinds

Hand Cars, Push Cars, Velocipede Cars, Track Laying Cars, Various Track Tools, Rail Sanders, Track Levels, Jumper Track Jacks, Friction Track Jacks, Track Shovels, Rail Braces.

Dealers in everything used in Constructing and Operating Railroads

THE RAILWAY SUPPLY CO.

Nos. 7 and 9, North Third St.
ST. LOUIS

EXCLUSIVE MANUFACTURERS

J. A. MCGREW, Pres.

H. D. BRUNING, V. Pres. and Mgr.

P. C. CALDWELL, Sec. and Treas.

The NATIONAL ENGINEERING CO.

(Inc.)

Architects, Engineers, and Constructors.

Consultation Expert Reports.

COLUMBUS, OHIO

Designs, Estimates, Specifications, Inspection and Reports upon Steam and Electric Railways, Bridges, Buildings and Foundations.

PAROID

"IT LASTS"

ROOFING

has the endorsement of some of the largest railroad systems in this country for all kinds of railroad buildings

F. W. BIRD & SON, MAKERS

CHICAGO

EAST WALPOLE, MASS.

NEW YORK



KOLESCH & CO.

138 Fulton Street, NEW YORK

MANUFACTURERS OF HIGH-GRADE

Surveying Instruments Drawing Materials

"Precision" Slide Rules, 5, 8, 10, 15, 20 inches long
SEND FOR ILLUSTRATED CATALOGUE

CLASSIFIED INDEX OF ADVERTISERS
(CONTINUED)

Drilling Machinery for Wells, Etc.
Keystone Driller Co., Beaver Falls, Pa.
Dump Cars.
Rodgers Ballast Car Co., Chicago.
Electric Crossing Bells.
Schwarze Electric Co., Adrian, Mich.
Employment Bureau.
New York Engineering Agency, New York.
Engines, Gas and Gasoline.
Otto Gas Engine Works, Chicago.
Engines, Steam or Gasoline, for Concrete Mixers.
Chicago Concrete Machinery Co., Chicago.
Engines, Moistening.
McKeown, H. J., Cincinnati, O.
Excavating Machinery.
Atlantic Equipment Co., New York.
Expanded Metal.
Merritt & Co., Philadelphia, Pa.
Extension Bells.
Schwarze Electric Co., Adrian, Mich.
Fire Proof Paint.
Detroit Graphite Mfg. Co., Detroit.
Forges, Portable.
Railway Supply Co., St. Louis.
Forgings.
Cleveland City Forge & Iron Co., Cleveland, O.
Frogs and Crossings.
Buda Foundry & Mfg. Co., Chicago.
Indianapolis Switch & Frog Co., Springfield, O.
Gas Engines.
Otto Gas Engine Works, Chicago.
Chicago Concrete Machinery Co., Chicago.
Gaskets.
McCord & Co., Chicago.
Railway Supply Co., St. Louis.
Conduits.
Evans & Howard Fire Brick Co., St. Louis, Mo.
Gasoline Engines for Concrete Mixers.
Chicago Concrete Machinery Co., Chicago.
Gates, Railroad Crossing.
Buda Foundry & Mfg. Co., Chicago.
Graphite.
Detroit Graphite Mfg. Co., Detroit.
Dixon, Jos., Crucible Co., Jersey City, N. J.
Railway Supply Co., St. Louis.
Sherwin-Williams Co., Cleveland, O.
Graphite Paint.
Wadsworth-Howland Co., Chicago.
Head Cars.
Buda Foundry & Mfg. Co., Chicago.
Railway Supply Co., St. Louis.
Head Rail Paint.
Wadsworth-Howland Co., Chicago.
Moistening Engines.
McKeown, H. J., Cincinnati, O.
Otto Gas Engine Works, Chicago.
Inspection Cars.
Buda Foundry & Mfg. Co., Chicago.
Railway Supply Co., St. Louis.
Instruments, Engineering and Surveying.
Hanna Mfg. Co., Troy, N. Y.
Kolesch & Co., New York.
Insulating Gums.
Standard Asphalt & Rubber Co., Chicago.
Jacks.
Buda Foundry & Mfg. Co., Chicago.
Dudgson, Richard, New York.
Duff Mfg. Co., Allegheny, Pa.
Henderers, A. L. Sons, Wilmington, Del.
Railway Supply Co., St. Louis.
Watson-Stillman Co., New York.

**The Keystone Blast Hole Driller**

is a Portable Well Drilling Machine, especially adapted for work in heavy R. R. cuts and Canal Excavation; River and Harbor Exploration; Concrete Piling, etc. We also make machines for Mineral Prospecting for Gold and Zinc; Percussion Coal Coring Tools, Water and Oil Rigs for all depths.

OUR 5 CATALOGS COVER THE FIELD.

KEYSTONE DRILLER CO., Marginal Road, Beaver Falls, Pa.

Jacks, Hydraulic.
Dudgson, Richard, New York.
Henderers, A. L. Sons, Wilmington, Del.
Railway Supply Co., St. Louis.
Watson-Stillman Co., New York.
Journal Box Brasses.
Adreon & Co., St. Louis, Mo.
Journal Box Kids.
Adreon & Co., St. Louis, Mo.
Journal Box Wedges.
Adreon & Co., St. Louis, Mo.
Lamps and Lanterns.
Adreon & Co., St. Louis, Mo.
Railway Supply Co., St. Louis.
Adreon & Co., St. Louis, Mo.
Light, Locomotives (See Locomotive Contractors.)
Lights, Contractors.
Wells Light Mfg. Co., New York.
Railway Supply Co., St. Louis.
Lockers, Metal.
Merritt & Co., Philadelphia.
Locomotives.
Terbert, A. C. & Co., Chicago.
Vulcan Iron Works, Wilkesbarre, Pa.
Locomotives, Compressed Air.
Atlantic Equipment Co., New York.
Porter, H. K. Co., Pittsburg, Pa.
Locomotives, Contractors.
Atlantic Equipment Co., New York.
Hicks, F. M. & Co., Chicago.
Porter, H. K. Co., Pittsburg.
Locomotives, Electric.
Atlantic Equipment Co., New York.
Porter, H. K. Co., Pittsburg.
Locomotive Headlights.
Adreon & Co., St. Louis, Mo.
Locomotives, Mine.
Atlantic Equipment Co., New York.
Porter, H. K. Co., Pittsburg.
Locomotives, Rebuilt.
Atlantic Equipment Co., New York.
Hicks Locomotive & Car Works, Chicago.
Locomotives, Second Hand.
Atlantic Equipment Co., New York.
Hicks Locomotive & Car Works, Chicago.
Logging Cars.
Buda Foundry & Mfg. Co., Chicago.
Railway Supply Co., St. Louis.
Lubricants (Graphite).
Dixon, Joseph, Crucible Co., Jersey City, N. J.
Mastics.
Standard Asphalt & Rubber Co., Chicago.
Measuring Tapes.
Hanna Mfg. Co., Troy, N. Y.
Kolesch & Co., New York.
Mineral Rubber.
Standard Asphalt & Rubber Co., Chicago.
Nut Locks.
American Lock Nut Co., Boston, Mass.
Railway Supply Co., St. Louis.
Spencer Otis Co., Chicago.
Oil Tanks.
Bowser, S. F., & Co., Ft. Wayne, Ind.
Paints.
Carey Mfg. Co., The Philip, Cincinnati, O.
Detroit Graphite Mfg. Co., Detroit.
Devos, F. W., & Co., New York.
Dixon, Joseph, Crucible Co., Jersey City, N. J.
Sherwin-Williams Co., Cleveland, O.
St. Louis Surfact & Paint Co., St. Louis, Mo.
Wadsworth-Howland Co., Chicago.
Paint and Varnish Gums.
Standard Asphalt & Rubber Co., Chicago.
Paving Asphalt and Fillers.
Standard Asphalt & Rubber Co., Chicago.
Perforated Metal.
Adreon & Co., St. Louis, Mo.
Railway Supply Co., St. Louis.
Pile Driving Engines.
McKeown, H. J., Cincinnati, O.
Pipe, Cast Iron.
Yale, Julian L. & Co., Chicago.
Pipe Clay Churn.
Evans & Howard Fire Brick Co., St. Louis, Mo.
Pine Dip and Coatings.
Standard Asphalt & Rubber Co., Chicago.
Pipe Joint Paste.
Detroit Graphite Mfg. Co., Detroit.
Pipe, Reinforced Concrete.
Reinforced Concrete Pipe Co., Jackson, Mich.
Pneumatic Crossing Gates (See Gates Railroad Crossing.)
Pneumatic Gates.
Buda Foundry & Mfg. Co., Chicago.
Pumps.
Bowser, S. F., & Co., Ft. Wayne, Ind.
Pumps, Boiler Test.
Henderers, A. L. Sons, Wilmington, Del.
Punches.
Henderers, A. L. Sons, Wilmington, Del.
Push Cars.
Buda Foundry & Mfg. Co., Chicago.
Rail Benders.
Adreon & Co., St. Louis.
Buda Foundry & Mfg. Co., Chicago.
Spencer Otis Co., Chicago.
Rail Braces.
Adreon & Co., St. Louis.
Buda Foundry & Mfg. Co., Chicago.
Indianapolis Switch & Frog Co., Springfield, O.
Railway Supply Co., St. Louis.
Rail Drills.
Buda Foundry & Mfg. Co., Chicago.
Indianapolis Switch & Frog Co., Springfield, O.
McInnes Steel Co., Corry, Pa.
Railway Supply Co., St. Louis.
Rail Joints.
Buda Foundry & Mfg. Co., Chicago.
Snow, J. H. Indianapolis, Ind.
Rail Saw.
Adreon & Co., St. Louis.
Railroad Equipment and Supplies.
Adreon & Co., St. Louis.
Atlantic Equipment Co., New York.
Buda Foundry & Mfg. Co., Chicago.
Indianapolis Switch & Frog Co., Springfield, O.

**LIGHT LOCOMOTIVES**

For all Classes of Service

VULCAN IRON WORKS

WILKES BARRE, PA.

HUDSON TRACK DRILLS

Made of High Power Steel. Will cut faster and outwear any other drill. Made with Flatted Shanks at no additional cost. Complete line of Hudson Taper Shank, Straight Shanks, and Jobbers Length drills carried in stock.

Baldwin Steel Company

133 Reade Street NEW YORK

CLASSIFIED INDEX OF ADVERTISERS
(CONTINUED)

Hicks Locomotive & Car Works, Chicago.
 McCord & Co., Chicago.
Rolls (New)
 Atlantic Equipment Co., New York.
Rolls (Second Hand)
 Atlantic Equipment Co., New York.
 Hicks Locomotive & Car Works, Chicago.
Railroad Coatings.
 Standard Asphalt & Rubber Co., Chicago.
Railway Equipment and Supplies.
 Railway Supply Co., St. Louis.
Railways Supplies, General.
 Adreon & Co., St. Louis.
 Buda Foundry & Mfg. Co., Chicago.
 Railway Supply Co., St. Louis.
Matchless Wrenches.
 Adreon & Co., St. Louis, Mo.
Replacers Car, and Engines.
 Adreon & Co., St. Louis, Mo.
Replacers.
 Otto Gas Engine Works, Chicago.
Rolling Steel Doors and Shutters.
 Adreon & Co., St. Louis, Mo.
Rolling Stock.
 Atlantic Equipment Co., New York.
 Hicks, F. M., & Co., Chicago.
Roof Paint.
 Bird, F. W. & Son, East Walpole, Mass.
 Carey Mfg. Co., The Philip, Cincinnati, O.
 Stowell Mfg. Co., Jersey City, N. J.
Roofing.
 Bird, F. W. & Son, E. Walpole, Mass.
 Stowell Mfg. Co., Jersey City, N. J.
Roofing Materials.
 Standard Asphalt & Rubber Co., Chicago.
Roofing Materials, Asbestos.
 Franklin Mfg. Co., Franklin, Pa.
Roofing Slates and Shingles, Asbestos.
 Franklin Mfg. Co., Franklin, Pa.
Safety Gates.
 Buda Foundry & Mfg. Co., Chicago.
Sand Drills.
 Parkhurst & Wilkinson, Chicago.
Scales.
 Buda Foundry & Mfg. Co., Chicago.
Second Hand Equipment.
 Atlantic Equipment Co., New York.
 Hicks Locomotive & Car Works, Chicago.
Semaphore Signals.
 Wendt Coupler Co., Marshfield, Wis.
Sewer Pipes.
 Evans & Howard Fire Brick Co., St. Louis, Mo.
Sheathing, Asbestos.
 Franklin Mfg. Co., Franklin, Pa.
Shovels.
 Jackson Tool & Shovel Co., Montpelier, Ind.
 Railway Supply Co., St. Louis.
Shutters, Rolling Steel.
 Adreon & Co., St. Louis, Mo.
 Columbus Steel Rolling Shutter Co., Columbus, O.
Signal Bells for Crossings.
 Schwarz Electric Co., Adrian, Mich.
Signaling Device.
 Wendt Coupler Co., Marshfield, Wis.
Signal Lamps.
 Adreon & Co., St. Louis, Mo.
 Railway Supply Co., St. Louis.
Signals.
 Adreon & Co., St. Louis, Mo.
Slide Rules.
 Kolesch & Co., New York.
Smoke Stacks.
 Adreon & Co., St. Louis, Mo.
 Dickinson, Paul, Chicago.
Stacks, Smoke.
 Dickinson, Paul, Chicago.
Stand Pipes.
 Adreon & Co., St. Louis.
Station Paint.
 Wadsworth-Howland Co., Chicago.
Steam Shovels.
 Atlantic Equipment Co., New York.
 Torbert, A. C. & Co., Chicago.
Steel for Track Drills and Tools.
 McInnes Steel Co., Corry Pa.
Steel Ties.
 Galt, Thomas A., Sterling Ill.
Stock Guards.
 Johnson Co., W. P., Chicago.
 Standard Cattle Guard Co., Birmingham, Ala.
Stoves.
 Buda Foundry & Mfg. Co., Chicago.
Structural Iron Paints.
 Carey Mfg. Co., The Philip, Cincinnati, O.
 St. Louis Surface & Paint Co., St. Louis.
 Wadsworth-Howland Co., Chicago.
Surveying Instruments.
 Hanna Mfg. Co., Troy, N. Y.
 Kolesch & Co., New York.
Switch Indicator Bells.
 Schwarz Electric Co., Adrian, Mich.
Switches and Switch Stands.
 Buda Foundry & Mfg. Co., Chicago.
 Indianapolis Switch & Frog Co., Springfield, O.
Tackle Blocks.
 Patterson Co., W. W., Pittsburg, Pa.
Tanks and Tank Fixtures.
 American Valve & Meter Co., Cincinnati, O.
 Gas Engine Works, Chicago.

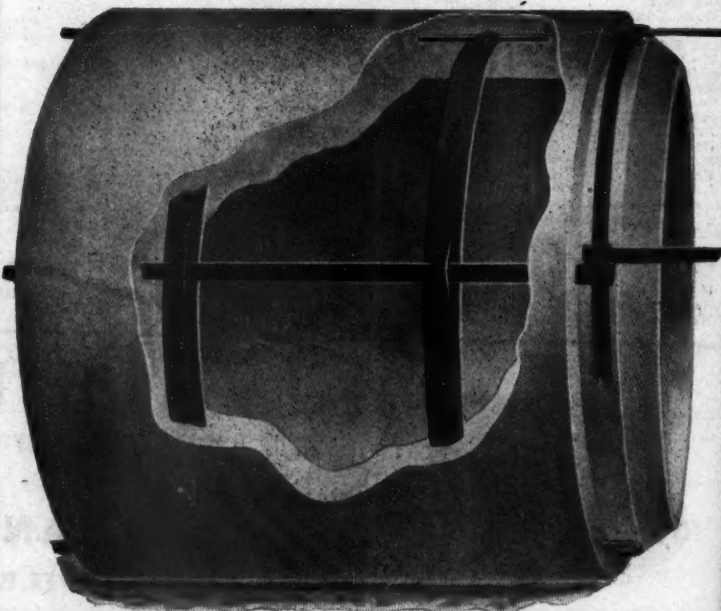
Telephone Extension Bells.
 Schwarz Electric Co., Adrian, Mich.
Tie Plates.
 Adreon & Co., St. Louis.
 Spencer Otis Co., Chicago.
Ties, Steel.
 Galt, Thomas A., Sterling, Ill.
Tool Steel.
 McInnes Steel Co., Corry Pa.
Track Drills.
 Buda Foundry & Mfg. Co., Chicago.
 Baldwin Steel Co., New York.
 McInnes Steel Co., Corry, Pa.
 Millers-Falls Co., New York.
 Reed Co., Francis, Worcester, Mass.
Track Gauges and Level.
 Buda Foundry & Mfg. Co., Chicago.
 Railway Supply Co., St. Louis.
Track Jacks (See Jacks.)
Track Laying Machinery.
 D. F. Holman Track Layer Co., Chicago.
Track Signs.
 Adreon & Co., St. Louis.
 Buda Foundry & Mfg. Co., Chicago.
Track Materials.
 Indianapolis Switch & Frog Co., Springfield, O.
Track Tools.
 Adreon & Co., St. Louis.
 Buda Foundry & Mfg. Co., Chicago.
 Detroit Tool Co., Detroit, Mich.
 Jackson Tool & Shovel Co., Montpelier, Ind.
 Millers-Falls Co., New York.
 Railway Supply Co., St. Louis.
 Walters & Okall, Ft. Madison, Ia.
Transfer Tables.
 Nichols, Geo. P., & Bro., Chicago, Ill.

Trench Braces.
 Potter Mfg. Co., Indianapolis, Ind.
Trench Machinery.
 Potter Mfg. Co., Indianapolis, Ind.
Turnbuckles.
 Cleveland City Forge & Iron Co., Cleveland, O.
Turntables.
 Nichols, Geo. P., & Bro., Chicago.
Valves.
 American Valve & Meter Co., Cincinnati, Varnishes.
 Devos, F. W., & Co., New York.
Velocipedes, Railway.
 Buda Foundry & Mfg. Co., Chicago.
 Railway Supply Co., St. Louis.
Vices.
 Adreon & Co., St. Louis, Mo.
 Dickinson, Paul, Chicago.
Vise, Combination Tool.
 Detroit Tool Co., Detroit, Mich.
Water Columns.
 American Valve & Meter Co., Cincinnati, Water Proofing.
 Standard Asphalt & Rubber Co., Chicago.
Water Softening Apparatus.
 Kennicott Water Softener Co., Chicago.
Water Tanks.
 Adreon & Co., St. Louis.
 Railway Supply Co., St. Louis.
Well Drilling Machinery.
 Keystone Driller Co., Beaver Falls, Pa.
Wire Ropes.
 Railway Supply Co., St. Louis.
Wrecking Cars.
 Buda Foundry & Mfg. Co., Chicago.
Wrecking Frogs.
 Railway Supply Co., St. Louis.

Reinforced Concrete Pipe

FOR CONDUITS AND RAILROAD CULVERTS

Reinforced Interlocking Joints Makes It the Strongest and Most Durable. Will Stand Any Fill.



BETTER THAN IRON PIPE

Correspondence of Railroad Engineers and Contractors Solicited. Write for Our New Illustrated Catalogue. You will be interested.

REINFORCED CONCRETE PIPE CO.

Jackson, Michigan

NEW TECHNICAL BOOKS

Third Edition

4to, Cloth, 664 Pages, Illustrated.

Price, \$7.00 Net

Reinforced Concrete

By CHARLES F. MARSH
Assoc. M. Inst. C. E., Assoc. M. Inst. M. E.

WITH MANY DIAGRAMS AND FOLDING PLATES

12mo, Cloth, 345 pp., Illustrated.

Price, \$3.00 Net

Long-Distance Electric Power Transmission

Being a Treatise on the Hydro-Electric Generation of Energy, Its Transformation, Transmission and Distribution

By ROLLIN W. HUTCHINSON, Jr.

Consulting Electrical Engineer; Associate Member Am. Inst. of Electrical Engineers, and Member of the Electrochemical Society

4to, Cloth, 465 Pages, Illustrated.

Price, \$10.00 Net

Electric Railway Engineering

By H. F. PARSHALL, M. Inst. C. E., Consulting Engineer, and
H. M. HOBART, M. I. E. E., Consulting Engineer

WITH MANY ILLUSTRATIONS, DIAGRAMS and TABLES

12mo, Cloth, 183 pp., Illustrated.

Price, \$3.00 Net

The Chemistry and Technology of Mixed Paints

By MAXIMILIAN TOCH

WITH 62 PHOTO-MICROGRAPHS AND ENGRAVINGS

4to, Cloth, Plates and Text.

Price, \$3.50 Net

Graphical Handbook for Reinforced Concrete Design

By JOHN HAWKESWORTH, C. E.

Sixth Edition, thoroughly revised and enlarged, 1906

12mo, Cloth, 223 pp., 134 Illustrations.

Price, \$1.00 Net

The Management of Electrical Machinery

A Thoroughly Revised and Enlarged Edition of the Practical Management of Dynamos and Motors.

By FRANCIS B. CROCKER, E. M., Ph. D., and
SCHUYLER S. WHEELER, D. Sc.

4to, Cloth, 520 pp., with folding plates.

Price, \$10.00 Net

The Mechanical Handling of Material

Being a treatise on the handling of material, such as coal, ore, timber, etc., by automatic or semi-automatic machinery, together with the various accessories used in the manipulation of such plant; also dealing fully with the handling, storing and warehousing of Grain.

By GEORGE FREDERICK ZIMMER, A. M. I. C. E.

WITH FIVE HUNDRED AND FIFTY ILLUSTRATIONS

12mo, Cloth, 154 pp., Illustrated.

Price, \$2.00 Net

The Chemistry of Paints and Paint Vehicles

By CLARE H. HALL, B. S.

Chemist for The Charles Moser Company

D. VAN NOSTRAND COMPANY

Publishers and Booksellers. 23 Murray and 27 Warren Sts., New York

RODGER BALLAST HART CONVERTIBLE CAR THREE CARS IN ONE



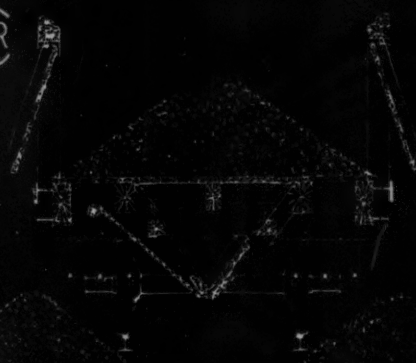
CONSTRUCTION
BALLAST
GENERAL FREIGHT



BUILT OF 30 TO 60 TONS
CAPACITY AND OF EITHER
WOOD OR STEEL

CHANGED FROM CENTER
DUMP TO SIDE DUMP OR
VICE-VERSA IN 20 MIN-
UTES WITHOUT TOOLS

THOUSANDS IN DAILY SERVICE
HAVE PROVEN ITS GREAT
ECONOMY AND PRAC-
TICABILITY

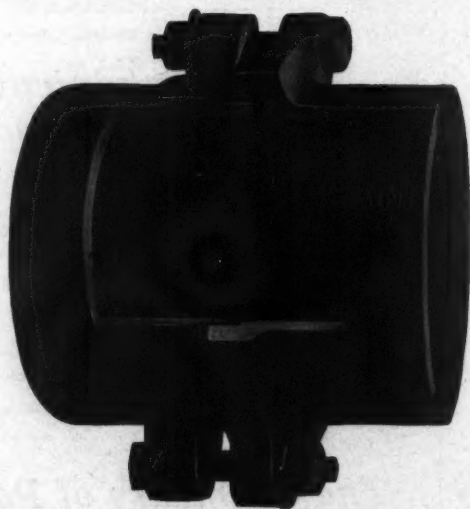


RODGER BALLAST CAR CO. RAILWAY EXCHANGE
CHICAGO, ILL.

Universal Cast Iron Pipe

Patented October 28, 1902

SECTIONAL VIEW OF JOINT



A straight taper joint, machined but not ground.
No lead or other packing material required.
Practically perfect electrical continuity at joints, thus
insuring protection from electrolysis.

MADE BY
CENTRAL FOUNDRY CO.
New York City

Julian L. Yale & Co.

Agents for Railway Trade

Railwa Exchange

Telephone Harrison 1211

CHICAGO, ILL.

We Sell
Good

Bridge Paint

Send for an attrac-
tive collection of
half tone engrav-
ings showing promi-
nent bridges paint-
ed with

Superior
Graphite
Paint

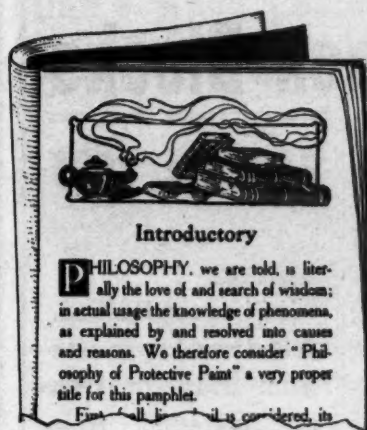
Detroit Graphite Mfg. Co.,
DETROIT, MICH.

Track Laying by Machinery

Simple—Rapid—Economical

D. F. HOLMAN RAILWAY TRACK LAYER CO.

1105 Ellsworth Bldg, Chicago



Introductory

PHILOSOPHY, we are told, is literally the love of and search of wisdom; in actual usage the knowledge of phenomena, as explained by and resolved into causes and reasons. We therefore consider "Philosophy of Protective Paint" a very proper title for this pamphlet.

First, all kinds of paint are considered, its

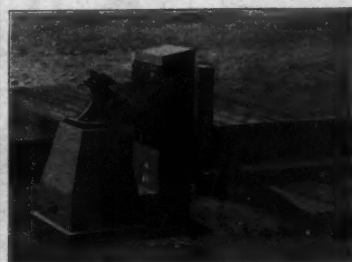
If you want the complete story of the Philosophy of Protective Paint just write us (a postal will do) asking for free copy.

B-187

This treatise was written by the superintendent of a large paint works, who, in addition to a technical training has had years of practical experience in making and testing paint.

It will be more than worth your while to get the "whole story."

**JOSEPH DIXON
CRUCIBLE CO.
JERSEY CITY, N. J.**



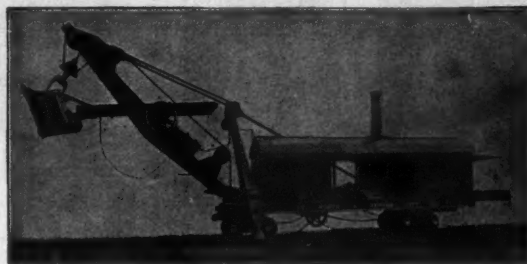
ELLIS PATENT BUMPING POST

Noted for Simplicity, Strength and Lasting Qualities. Adapted to all positions.

**Mechanical Mfg. Co.,
CHICAGO, ILL.**

Steam Shovels, Locomotives, Cars, Etc.

Delivered right out of our shops, All Ready for Service. **SPECIAL—IMMEDIATE DELIVERY**



MODERN STEAM SHOVELS

Four 65-ton Bucyrus, 2½-yd. dippers, 3 sets engines, excellent shovels.

Three 65-ton Model "G" Marions, 2½ yd. dippers, independent thrashing engines, fine machines.

Four 70-ton Bucyrus, 2½ to 3-yd. dippers, 3 sets engines little used.
One 75-ton Model "80" Marion, 3½-yd. dipper, 3 sets engines, splendid modern shovel.
One 60-ton Giant "D" Vulcan, 2½-yd. dipper, 3 sets engines, first-class.
One 70-ton Giant "C" Vulcan, 2½ to 3-yd. dipper, 3 sets engines, equipped with new model "60" boiler, thorough order. **ALSO OTHERS.**

Flat Cars, Box Cars, SPECIAL LOT—50,000 and 60,000 lbs. capacity, equipped with Westinghouse Air Brakes, Automatic Couplers, etc. **Also Other Equipment.**

Telegraph, telephone or write us. Correspondence Solicited,

A. C. TORBERT & COMPANY

Chicago, Ill.

547-548 Monadnock Block

Shops at Chicago



No. 68. "Steel Works."



No. 26. "Contractors."

The Engineering Department

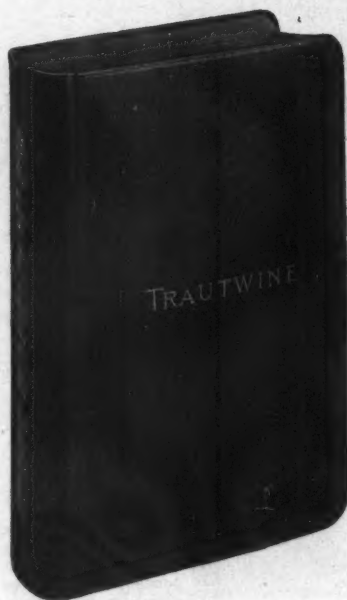
of Every Large Railroad and Every Railroad Contractor should have a copy of our Illustrated Catalogue with 200 pages of Useful Information not elsewhere printed. Address:

H. K. PORTER COMPANY,

Contractors' Locomotives on Hand in Stock.

CORNER SIXTH AND WOOD
PITTSBURGH, PA.

TRAUTWINE'S Civil Engineer's



POCKET BOOK

\$5.00

**John Wiley
& Sons**
43 East Nineteenth St.
NEW YORK

Patterson Blocks



ARE THE BEST

All Sheaves Bushed.
All Hooks made
from Staybolt Iron
and flattened. Also
Extra Heavy Oil
Well Blocks.

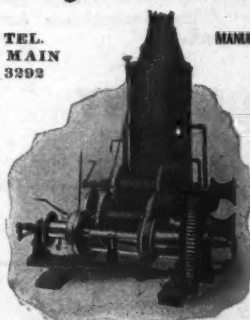
WRITE FOR PRICES

W. W. Patterson Company
56 Water Street PITTSBURGH

H. J. McKEOWN

TEL.
MAIN
3292

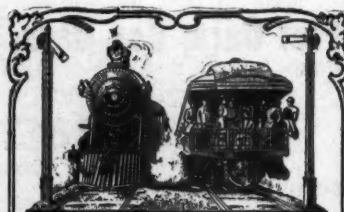
MANUFACTURERS OF



Contractors
Plant,
Stone
Hoisting
and Pile
Driving
Engines
Crabs and
Derrick
Irons a
Specialty

Jobbing Promptly Attended to
612 E. FRONT ST., BET. PIKE AND BUTLER
CINCINNATI, OHIO

See Our
Book Department
Pages 12-13



COMING AND GOING

ALWAYS USE

"The Only Way"

NO DIRT
NO DUST



NO SMOKE
NO CINDERS

GEO. J. CHARLTON,
GENERAL PASSENGER AGENT
CHICAGO.

LOCKERS

MADE
BY US

of
Expanded
Metal or
Sheet Steel
Insure a
Positive
Security
and have
Points of
Superiority
over all
others.

We also
make
Metal
Shelving,
Screens
and
Inclosures

Write for
Catalogue



MERRITT & CO.

1124 Ridge Av., PHILADELPHIA

AMERICAN VALVE & METER CO.

CINCINNATI
OHIO

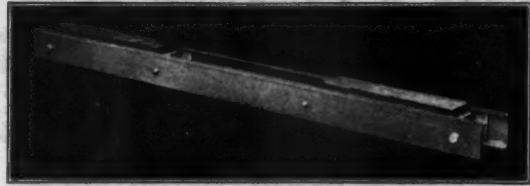
Poage's Water Columns. Tank Fixtures Brass Valves Babbitt Metal Water Motors

Galt's Wood Cushion Steel Tie

Has been tested many months in main track of a great overland trunk line of railroad. It grips roadbed firmly. No change from regular spikes necessary. Electric signals not interfered with. Firmer than wood tie, more resilient than all steel tie. Stands the heaviest traffic.



Wood Cushion.



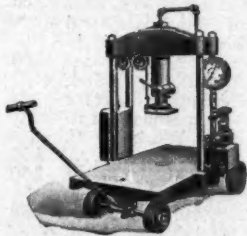
Write for full information and illustrated catalog.
Patented in United States and Great Britain.

Thomas A. Galt, Sterling, Illinois

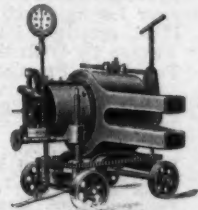
When in need of books see our list on
pages 12-13, and
write us

RAILWAY ENGINEERING

Security Building, Chicago



HYDRAULIC SHOP EQUIPMENT



Our 50 years in the manufacture of Hydraulic tools for Railroad shops have placed us in a position where we can furnish you with almost any Hydraulic apparatus necessary for a Railroad shop.

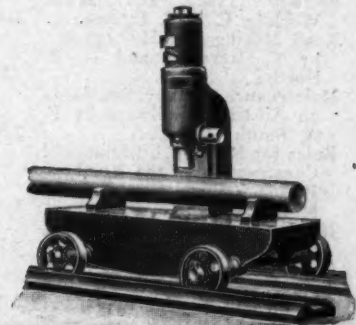
Send us your specifications for Hydraulic shop equipment, and we will be pleased to quote on same.

Every Watson-Stillman tool thoroughly guaranteed.

The Watson-Stillman Co.

26 Cortlandt St., New York City

Branch Office, 453 The Rockery, Chicago, Ill.



RAILWAY ENGINEERING

BOOK-SELLING DEPARTMENT

Any of the following books will be sent by mail, postage paid, upon receipt of the price. When ordering more than one copy state whether to be sent by express. Cash should be sent with order. Remit by postal or express money order or by bank draft on Chicago or New York. Write for our Catalogue of Books, Charts, and Models, explaining our easy payment plan.

Write for a Complete List
of Books. Address

RAILWAY ENGINEERING.

510 Security Building
CHICAGO, ILL.

TRACK AND ROADBED LOCATION, MAINTENANCE AND CONSTRUCTION.		A Manual of Land Surveying		Part 2. Graphic Statics		2.50
Street Railway Roadbed by Mason D. Pratt and C. A. Alden	\$ 2.00	by F. Hodgman	2.50	Part 3. Bridge Design		2.50
The Railroad Spiral by Wm. H. Searles	1.50	Specifications for Track Laying by W. Katté .....	.10	Part 4. Higher Structures ..		2.50
Notes on Electric Railway Economics and Preliminary Engineering by W. C. Gotshall	2.00	Railroad Location Surveys and Estimates by F. Laves.....	3.00	The Design of Steel Mill Buildings and the Calculation of Stresses in Framed Structures by M. S. Ketchum		4.00
The Transition Curve Field-Book by Conway R. Howard	1.50	Curve Tracing in Cartesian Coordinates by W. W. Johnson.	1.00	General Specifications for High Roofs and Buildings by Chas. E. Fowler (paper).....		.25
The Transition Curve by C. L. Crandall	1.50	BRIDGES, BUILDINGS, STRUCTURAL WORK.		General Specifications for Highway Bridges by E. Thacher. ....		.25
Handbook for Street Railroad Location by John P. Brooks.	1.50	American Railway Bridges and Buildings by Walter G. Berg.	3.50	Mill Building Construction by H. G. Tyrrell		1.00
Standard Turnouts on American Railroads by F. A. Smith	1.00	Specifications for Steel Bridges by J. A. L. Waddell.....	1.25	Graphics for Engineers, Architects, Builders by Chas. E. Greene:		
Railway Locations in Victoria, Australia, by D. M. Fraser..	.25	Bridge and Structural Design by Thomas W. Chase.....	1.25	Part 1. Roof Trusses		1.25
Maintenance of Way Standards by	1.50	Properties of Steel Sections by John C. Sample.....	3.00	Part 3. Arches in Wood, Iron and Stone		2.50
Engineering Preliminaries for an Interurban Electric Railway by Ernest Gonzenbach..	1.00	The Design of Simple Roof-Trusses in Wood and Steel by Malverd A. Howe	2.00	Tables and Diagrams for Calculating the Strength of Beams and Columns by Benj. E. Winslow		2.00
Practical Switch Work by D. H. Lovell	1.00	The Fireproofing of Steel Buildings by Joseph K. Frietag... ..	2.50	Practical Treatise on Foundations by W. M. Patten.....		5.00
The Economic Theory of the Location of Railways by Arthur M. Wellington	5.00	The Designing of Draw-Spans by Charles H. Wright.....	3.50	Thames River Bridge by A. P. Boller		5.00
Railroad Construction by Walter Loring Webb.....	5.00	Buildings and Structures of American Railroads by W. G. Berg	5.00	Theory and Practice in the Designing of Modern Framed Structures by O. W. Bryan..		10.00
Field Practice of Railway Location by Willard Beahan....	3.00	A Treatise on the Theory of the Construction of Bridges and Roofs by Prof. De Volson Wood	2.00	Graphic Method by Influence Lines for Bridge and Roof Computations by W. H. Burr		3.00
The Field Practice of Laying out Circular Curves for Railroads by J. C. Trautwine....	2.50	Compound Riveted Girders as Applied in Buildings by Wm. H. Birkmire	2.00	Inspection of Materials and Workmanship Employed in Construction by A. T. Byrne.		3.00
The Trackman's Helper by J. Kindelan	1.50	The Planning and Construction of High Office-Buildings by Wm. H. Birkmire.....	3.50	Ordinary Foundations, Including the Cofferdam Process for Piers, with numerous examples of Actual Work by C. E. Fowler		3.50
Railway Right of Way Surveying by Albert I. Frye.....	1.00	A Course on the Stresses in Bridges and Roof Trusses, Arched Ribs, and Suspension Bridges by Wm. H. Burr....	3.50	Bridge Trusses by C. E. Greene		2.50
Economics of Road Construction by H. P. Gillete.....	1.00	American Railroad Bridges by Theodore Cooper	2.00	Structural Mechanic by C. E. Greene		2.50
Railway Surveys and Resurveys by H. Paul.....	1.00	The Design and Construction of Metallic Bridges by W. H. Burr	5.00	Treatise on Arches by M. A. Howe E.....		4.00
Surveying Manual; A Manual of Field and Office Methods by Pence and Ketchum.....	2.00	A Treatise on Wooden Trestle Bridges by Wolcott C. Foster	5.00	Materials of Constructions by J. B. Johnson		6.00
The Railway Transition Spiral by Prof. A. N. Talbot.....	1.50	Practical Treatise on the Construction of Iron Highway Bridges by A. P. Boller.....	2.00	Permanent Fortifications by D. H. Mahan		7.50
Topographical Record and Sketch Book for Use with Transit and Stadia by D. L. Turner .....	.75	Types and Details of Bridge Construction by F. W. Skinner	3.00	Strength of Materials by M. Merriman		1.00
Railway Track and Track Work by E. E. R. Tratman....	3.00	Tables for Roof Framing by G. D. Inskip .....	.50	Graphic Statics with Applications to Trusses, Beams and Arches by J. Sondericker....		2.00
Road Making and Maintenance by C. Herschel and E. P. North .....	.50	Mathematical and Graphical Roof Framing by G. D. Inskip:		Pocket-book for Bridge Engineers: De Pontibus by J. A. Waddell		2.00
Maintenance of Way Standards on American Railways by F. A. Smith	2.50	Vol. 1. Text, cloth, 160 p.		Specifications for Steel Railroad Bridges and Structures by A. W. Buel .....		.50
Rules for Railway Location and Construction of the Northern Pacific Railway Co. by E. H. McHenry	1.00	Vol. 2. Tables of Reduction and Squares from Zero to 150 feet by 8ths and to 120 feet by 10ths	1.00	General Specifications for Foundations and Substructures of Highway and Electric Railway Bridges by T. Cooper...		1.00
Notes on Track by W. M. Camp	3.75	A Text-Book on Roofs and Bridges by Mansfield Merri- man and Henry S. Jacoby:		Specifications for Steel Highway Bridges by T. Cooper.....		.50
Construction American Railway, Development, Management, and Appliances	3.00	Part 1. Stresses in Simple Trusses	2.50	General Specifications for Steel Roofs and Buildings by C. E. Fowler .....		.25

BOOK DEPARTMENT (Continued)

EARTHWORK AND MASONRY AND ITS COST.

Specifications for Grading and Masonry for Railway Beds by W. Katte	25
Table of Cubic Yards by S. B. Fisher	25
Retaining-Walls for Earth by Malverd A. Howe	1.25
Earthwork and Its Cost by Halbert Powers Gillette	2.00
A Treatise on Masonry Construction by Ira O. Baker	5.00
A Method of Calculating the Cubic Contents of Excavations and Embankments by the Aid of Diagrams by J. C. Trautwine	2.00
Prismoidal Formulae and Earthwork by Thomas U. Taylor	1.50
Earth and Rock Excavation by C. Prelini	3.00
Tables for Calculating the Cubic Contents of Excavations and Embankments by John R. Hudson	1.00
Tunneling, Explosive Compounds, and Rock Drills by H. S. Drinker	25.00
Rock Excavation by Halbert Powers Gillette	3.00
Tunneling by C. Prelini, Additions by C. S. Hill	3.00
Ordinary Foundations by Charles Evan Fowler	
Railway and Other Earthwork Tables by Charles L. Crandall	1.50
Railroad Curves and Earthwork by C. F. Allen	2.00
Modern Stone-Cutting and Masonry by J. S. Siebert	1.50
Improvements of Rivers by B. F. Thomas	6.00
Design and Construction of Dams by E. Wegmann	5.00
Treatise on Roads and Pavements by I. O. Baker	5.00
Highway Construction by A. T. Byrne	5.00
City Roads and Pavements Suited to Cities of Moderate Size by W. P. Judson	2.00
Earth Dams by Burr Bussell	1.00
Earthwork Tables by H. S. Henderson	1.00

VENTILATION, HEATING, SEWERAGE.

The Heating and Ventilation of Buildings by R. C. Carpenter	4.00
Tables and Diagrams for Making Estimates for Sewerage Work by S. M. Swaab .....	.50
British Sewerage Works by M. N. Baker	2.00
Ventilation and Heating by John S. Billings	4.00
Electric Heating by E. J. Houston and A. E. Kennelly	1.00
American Plumbing Practice by Cleaning and Sewerage of Cities by Prof. R. Baumeister	2.00
Dimensions of Pipes, Fittings and Valves by W. D. Brown .....	.75
Steam Heating and Ventilation by William S. Monroe	2.00
Sewerage Work Analyses by C. J. Fowler	2.00

ELECTRICITY, DYNAMOS, MOTORS.

The Induction Motor by B. A. Behrend	1.50
The Induction Motor; Its Theory and Design by Boy de la Tour	2.50
Power Distribution for Electric Railways by Louis Bell	2.50
Electric Power Transmission by Louis Bell	4.00
Long Distance Electric Power Transmission by R. W. Hutchinson, Jr.	
Electricity One Hundred Years Ago and To-day by E. J. Houston	1.00
Electric Transmission of Water Power by Alton D. Adams ..	3.00
Electric-Dynamic Machinery by E. J. Houston and A. E. Kennelly	2.50
High Tension Power Transmission by	3.00
Berlin-Zossen Electric Railway Tests of 1903 by Louis Bell ..	3.00
Recent Types of Dynamo-Electric Machinery by Edwin J. Houston and A. E. Kennelly ..	4.00
Electrical Engineering Leaflets, Containing the Underlying Principles of Electricity and Magnetism by Edwin J. Houston and A. E. Kennelly. In three grades as follows:	
Elementary Grade	1.50
Intermediate Grade	1.50
Advanced Grade	1.50
Practical Calculation of Dynamo-Electric Machines by A. E. Wiener	3.00
Original Papers on Dynamo-Machinery and Allied Subjects by John Hopkinson ..	1.00
The Electric Motor by Edwin J. Houston and A. E. Kennelly ..	1.00
Alternating Electric Currents by E. J. Houston and A. E. Kennelly	1.00
The Theory and Calculation of Alternating Current Phenomena by Charles Proteus Steinmetz	4.00
The Art of Illumination by Louis Bell	2.50
Electric Arc Lighting by Edwin J. Houston and A. E. Kennelly	1.00
Electric Lighting Specifications by E. A. Merrill	1.50
Electric Incandescent Lighting by Edwin J. Houston and A. E. Kennelly	1.00
Modern Electric Railway Motors by George T. Hanchett ..	2.00
The Universal Wiring Computer by Carl Hering	1.00
Electricity and Magnetism by C. P. Steinmetz	2.50
Shop and Road Testing of Dynamos and Motors by E. C. Parham and J. C. Shedd ..	2.50
Spangenberg's Steam and Electrical Engineering by Messrs. E. Spangenberg, A. Uhl, and E. W. Pratt	3.50
Storage-Battery Engineering by Lamar Lyndon	3.00
Magnetism by Edwin J. Houston and A. E. Kennelly	1.00
Alternating Current Wiring and	

Distribution by William Leroy Emmet	1.00
Experiments with Alternate Currents of High Potential and High Frequency by Nikola Tesla	1.00
Alternating Current Transformer by F. G. Baum	1.50
Static Electricity by Hobart Mason	2.00
Diagram of Electrical Connections by Cecile P. Poole	2.00
Designs for Small Dynamos and Motors by Cecile P. Poole ..	2.00
Dynamo Design; Its Theory and Practice by A. Press	2.00
Lecture Notes on the Theory of Electrical Measurements by A. W. Anthony	1.00
Practical Management of Dynamos and Motors by F. M. Crocker and S. S. Wheeler ..	1.00
The Dynamo, Its Theory, Design and Manufacture by C. C. Hawkins and F. Wallis ..	3.00
Alternating Currents and Alternating Machines by D. C. Jackson	3.50
Transformers for Single and Multiphase Currents by G. Kapp	1.75
Management of Dynamos by G. W. Paterson	1.50
Electric Motor Construction for Amateurs by C. D. Parkhurst	1.00
Electric Railway Motors by N. W. Perry	1.00
Alternating Current Engineering Practically Treated by E. B. Raymond	2.50
Alternating Current Machines by Sheldon and Mason	2.50
Dynamo Electric Machinery by Samuel Sheldon	2.50
Dynamos and Electric Motors Ed Trevert .....	.50
Electric Bells and All About Them by S. R. Bottone .....	.75
The Engineering and Electric Traction Pocket-book by Philip Dawson	5.00
Electrical Engineers' Pocket-Book by Horatio Foster	5.00
The Application of Electricity to Railway Working by W. E. Langdon	5.00
TELEPHONY AND TELEGRAPHY.	
Telephony by A. V. Abbott	6.00
Vol. 1. The Location of Central Offices	1.50
Vol. 2. The Construction of Underground Conduits	1.50
Vol. 3. The Cable Plant	1.50
Vol. 4. Construction of Aerial Lines	1.50
Vol. 5. The Substation	1.50
Vol. 6. Switchboards and the Central Office	1.50
Wireless Telegraphy by A. Frederick Collins	3.00
Electric Telegraphy by Edwin J. Houston and A. E. Kennelly	1.00
American Telephone Practice by Kempster B. Miller	4.00
Synchronous and Other Multiple Telegraphs by Albert Cushing Crehore	2.00

STOP!

Your present method of handling oil in signal and interlocking towers is dangerous. It's out of date because safety is not considered. It's out of date because the Bowser insures safety.



UNDERGROUND TANK

We manufacture oil house equipments, oil storage systems oil tanks and pumps.

**THE BOWSER SYSTEM
OF OIL STORAGE FOR SIGNAL TOWERS, ETC.**

Provides for storing the oil in an underground tank outside the tower alongside the track where the tank can be easily filled direct from the supply car.

An adjustable measure pump in the tower draws exactly enough oil at each stroke to fill a lamp, measuring the oil directly into the lamp.

There is no spill, no waste, no overflow, no evaporation, no gases and no danger, no tin funnels, no measures, no oily waste.

For information send for bulletin VII

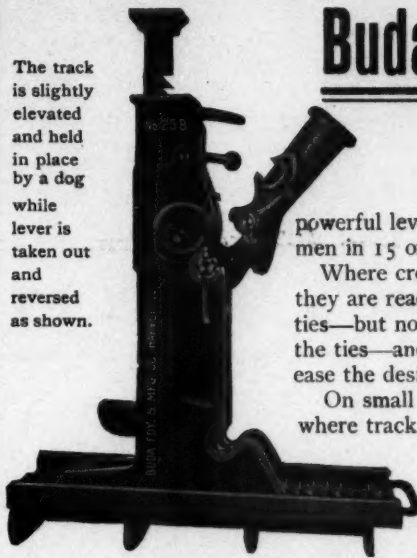
S. F. BOWSER & CO., Inc.,

Fort Wayne, Ind.

Cat 126-S.M.
Pump in Tower

Buda Lining-Up Jack

The track is slightly elevated and held in place by a dog while lever is taken out and reversed as shown.



The advantages of these Jacks may be appreciated when it is known that two men alone can line up track, crossings, etc., and accomplish, by the powerful leverage in two minutes, more than eight men in 15 or 20 minutes.

Where crossings, for instance, require attention, they are readily elevated just enough to loosen the ties—but not to allow cinders to fall in and around the ties—and then the crossing can be forced with ease the desired distance.

On small divisions and branch lines where track force is always too small to give proper attention to lining up, and during those seasons when the main line force is greatly reduced, these jacks are of great

value; for a section foreman and one man can line up track as readily as they may tighten up nuts.

The jack proper may be slid out of base and made to fit all requirements of our No. 1 standard trip jack. The jacks are of 12-ton capacity each and are used in pairs. They are a valuable acquirement and should be on every section. Order a pair of Buda Lining-up Jacks for trial.

Jack can be used without base. Fulfills all requirements of our Standard No. 1 Trip Ratchet Track Jack.



The Buda Foundry & Manufacturing Co.

CHICAGO

NEW YORK

ST. LOUIS

HARVEY, ILL.

Railway Engineering One Year--One Dollar

The "Wells Light"



Is the
Standard
with all
Railroads
and
Contractors

17,000 in use in the United States and Canada.

For accidents at night, for night construction. It is "Always Ready." Unaffected by weather. Made in sizes. 800, 2,000 to 4,000 candle power from kerosene oil.

The "Wells Light"

(Registered Title) Wallwork & Wells' Patents

Since its adoption for tire expanding, has met with unbounded success, having already been adopted by a number of roads.

The Wells Light Manufacturing Company

EDWARD ROBINSON, Sole Proprietor

46 Washington St., New York

CHICAGO AGENTS, CRERAR, ADAMS & CO.

CLARK'S PERFECT SAND DRIER



No. 1 Dries About 10 Tons a Day
No. 2 Dries About 5 Tons a Day

PARKHURST & WILKINSON CO.

Iron, Steel and Railway Supplies

CHICAGO, ILL.



RICHARD DUDGEON

*Inventor, Patentee and Original
Manufacturer of the*

*Hydraulic Jack, the Hydraulic Punch
and Roller Tube Expander*

RICHARD DUDGEON, - NEW YORK

The "Leader" STEEL CATTLE GUARD



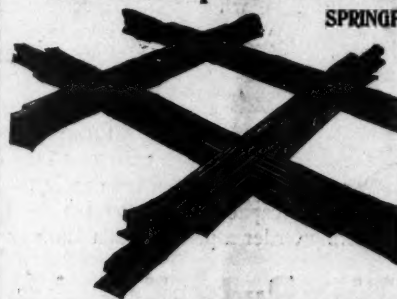
Represents
Standard Practice

**Simple,
Effective
Economical**

The W.P. Johnson Co.

25 LaSalle, Street, Chicago

The Indianapolis Switch & Frog Co. SPRINGFIELD, OHIO



**Crossings
Frogs
Switches
Stands
Etc.**

**IN USE WHEREVER HIGHEST GRADE WORK
IS REQUIRED**



Poage Style D Water Crane

Five Foot Vertical Adjustment, Three Foot Lateral Movement,
Non-Freezeable; No Water Wasted

American Valve and Meter Company
CINCINNATI, OHIO

Manufacturers

Poage Automatic Water Cranes, Automatic Shut-off Inlet Valves
Tank Valves, Tank Fittings, Economy Switch Stands
(Ground Throw) Cincinnati and Acorn Water Meters
Brass Valves, Unions, Etc.

Send for the Pictures and Description

CAREY'S Cement Roofing

The Oldest and Most Durable Composition Roofing on the
Market. In use on all classes of railroad buildings
throughout the United States.

Carey's Asphalt Roofing Paints

For Tin, Iron, Steel, Felt and Composition
Roofs; Bridges, Stacks, Boiler Fronts, etc.

Carey's Freight Car Roofing

2-ply, 3-ply and Burlap Center.

The PHILIP CAREY COMPANY

Sole Distributors.

General Offices, CINCINNATI, O.

JACKSON SHOVEL & TOOL CO.

—Manufacturers of—



**Track Shovels and
Locomotive Scoops**

MONTPELIER, INDIANA

Send for Our Catalogue.

